

4. [5 points] Consider the function $Z(w) = \arctan(kw) - (w + 1)$ where k is a nonzero constant. Use the limit definition of the derivative to write an explicit expression for $Z'(-2)$. *Your answer should not involve the letter Z . Do not attempt to evaluate or simplify the limit.* Please write your final answer in the answer box provided below.

Answer: $Z'(-2) =$

5. [9 points] A cylindrical bar of radius R and length L (both in meters) is put into an oven. As the bar gains temperature, its radius decreases at a constant rate of 0.05 meters per hour and its length increases at a constant rate of 0.12 meters per hour. Fifteen minutes after the bar was put into the oven, its radius and length are 0.4 and 3 meters respectively. At what rate is the volume of the bar changing at that point? *Be sure to include units.*

Answer: The volume of the bar is (circle one):

INCREASING

DECREASING

NOT ENOUGH INFORMATION

at a rate of _____.